is bad, and if permitted will greatly militate against convenience and uniformity in using the current both for light and for motive-power. Where the undertakers distribute "alternating" currents it is provided that the mains should have a "constant (?) difference of potential" or standard pressure of not less than forty-five and not more than six hundred volts. Here again we think that the Board of Trade might very wisely insist on a further restriction. If steady currents at a pressure of four hundred volts are dangerous, alternating currents at four hundred are far more so. Yet here the undertakers talk of six hundred! Indeed, considering the risks involved, and the difficulty in distributing alternating currents through long lines or lines where there is great self-induction; and also considering that the supply of electric currents is not for lighting alone but for the providing also of motive-power, it would not be any loss to the public if the use of alternating currents under the provisional orders were absolutely disallowed. It is true that the patentees of certain specific forms of machine might cry out loudly against such a prohibition; but the public would be guaranteed against one source of danger and difficulty. According to the orders the undertakers may charge consumers either by the amount of electric energy consumed, or by the quantity of electricity supplied, or by time, or by a yearly agreement. In connection with the first of these methods the proposal is made to call by the name "one unit" the energy contained in a current of 1000 amperes flowing under an electromotive force of one volt during one hour. Most of the provisional orders name sevenpence per unit as the price of electrical energy. We have here for the first time an actual quotation-price for *energy;* a fact which should be interesting to those who have striven so hard to drive into the popular mind exact ideas concerning energy and its conservation. One "unit" thus defined for commercial purposes being 1000 volt-amperes (*i.e.* 1000 watts) for one hour, and one horse-power being 746 watts, we see that the scale of payment is about $5\frac{1}{3}$ pence per hour per (electrical) horse-power.

Into the further provisions for the inspection and testing of mains, the inspection of meters, the testing of insulation, provisions for safety, and penalties for default in supply, we cannot here enter. Suffice it to say that there is no detail that does not appear to have had thought expended upon it, no provision that is really superfluous or harassing, no possible want or eventuality that does not appear to have been anticipated. Such masterly treatment cannot but greatly facilitate the work of the Board of Trade in agreeing to orders and licenses, and will tend to bring about unity of method in the organisation of the actual work of laying down town supplies so soon as such orders and licenses shall have been granted. If it be true that the effect of the Electric Lighting Act has been to produce a temporary lull in the progress of electric lighting, we are convinced that such a lull will be in the end an unmixed good, since it gives the opportunity for thought to ripen, and for projects and inventions to mature, if not to survive. Two dangers indeed seem yet possible in the future of public electric lighting, and either of them may be sufficiently serious to damage public confidence in this new industrial factor. Firstly, some better guarantees ought to be insisted on that the Companies or other parties who obtain orders or licenses as undertakers should be possessed of capital adequate to carry out the projects in hand. A very hasty glance at the list of applicants for provisional orders will suffice to show that this fear is not unfounded. Secondly, it ought to be made impossible for a Company which has obtained an order for any limited district to delegate the responsibility of supplying any section of such district to a sub-company. No Company should be allowed to hold a monopoly (if the limited monopoly created by the provisions of the Electric Lighting Act be a monopoly at all) of a single square yard of territory which it cannot with its own resources supply under the terms of the order or license which has been granted. If this principle be not upheld, serious abuses will creep in, to the detriment of progress and in contravention of the interests of the public.

CRYPTOGAMIC FLORA OF GERMANY, AUSTRIA, AND SWITZERLAND

Dr. L. Rabenhorst's Kryptogamen-Flora von Deutschland, Oesterreich, und der Schweiz. Zweiter Band: Die Meeresalgen Deutschlands und Oesterreichs. Bearbeitet von Ferdinand Hauck. 1-3 Lieferung. (Leipzig: Eduard Kummer, 1883.)

SINCE the appearance of the original work (1845-53) the systematic study of living algæ has, through a more accurate knowledge of the structure and fructification of these plants, led to great changes in their diagnosis and classification. Hence the necessity of a new edition of Rabenhorst's work.

In order to render it more valuable, the preparation of the parts of which it is composed have been intrusted to authors specially conversant with the subjects of which they treat. The first volume, five numbers of which have already appeared, contains the Fungi, and is edited by Dr. G. Winter of Zurich; the second comprises the Marine Algæ (exclusive of the Diatomaceæ); then will follow the Fresh-water Algæ, edited by Herr Paul Richter of Leipzig; the Diatomaceæ, by Dr. A. Grunow of Vienna; and the Frondose Mosses and Hepaticæ, by Herr G. Limpricht of Breslau. To these will succeed works on the Lichens, Charicæ, and Vascular Cryptogams.

The second volume, which forms the immediate subject of this notice, has been intrusted to M. F. Hauck, who, from his residence on the coast at Triest, has, during many years, had opportunities of studying marine algæ in a living state; and by his connection with German and other algologists, has been able to obtain authentic examples of most of the species. It may also be mentioned that M. Hauck has published "A List of the Algæ of the Adriatic" (*Beitr. z. Kenntn. d. adriat. Algen*, Wien, 1878).

The present work, of which three numbers have appeared, includes not only the algæ inhabiting the Austrian coast and islands of the Adriatic, but also those of the Baltic and North Seas, and the coasts of Heligoland with the adjacent islands: the latter have been found especially rich in species.

In the Introduction to his work, M. Hauck gives instructions for the collection and preparation of the various

kinds of marine algæ. The list of instruments and appliances used in collecting is rather formidable, but it must be remembered that the object of the algologist is to obtain specimens in as perfect a state as possible, for the purpose of instituting a searching examination into the structure and fructification of the plants; and this cannot be done without much labour and pains. In the case of small plants which adhere closely and spread over rocks and other objects, M. Hauck recommends that, instead of scraping off the algæ, portions of the rocks on which they grow should be chipped away with a geological hammer, and preserved with the growing plants upon them. Directions are also given for the treatment of the Corallinæ and other algæ which are covered with carbonate of lime, in order to divest them of the lime, and thus prepare them for microscopic examination. There are also instructions for preparing and mounting specimens of algæ for the microscope.

Every one who has endeavoured to cut sections of algæ for microscopic observation, must be aware of the difficulty, occasioned by the different structures of the plants, of performing this operation. The author shows how some of these difficulties may be avoided; but he has omitted to mention whether the sections should be made with a machine, or in the old-fashioned way, by holding the portion to be cut firmly with the forefinger nail of the left hand, while cutting the section with a sharp, thin knife.

We now come to the work itself. M. Hauck thus classifies the marine algæ: I. RHODOPHYCEÆ, plasma coloured red; II. PHÆOPHYCEÆ, plasma coloured brown; III. CHLOROPHYCEÆ, plasma chlorophyll-green; IV. CYANOPHYCEÆ, plasma bluish-green. Commencing with the Rhodophyceæ, he treats of the Florideæ, describing their structure and fructification. A summary of the families, with the names of the genera contained in each family, follows. M. Hauck's classification of the Florideæ is novel; it remains to be seen whether it will meet with the general approval of algologists. We have next a description of the genera and species. This part of the work is illustrated with figures drawn on zinc, of at least one species of each genus, as seen by transmitted, not reflected, light, the objects being represented as if transparent. Some of these illustrations are original, but the greater part are borrowed from Kützing, Thuret, Zanardini, and others. They are inserted in the text near to the species delineated,—an extremely convenient arrangement.

Besides these illustrations, there are five plates, representing different species of Lithophyllum and Lithothamnion. They were printed by the "Albertotype" process, from negatives executed under the supervision of the author. These plates are admirable, and give more correct and characteristic figures of these singular and in this country but little-known vegetable productions than can be obtained by any other process. Several species of Lithophyllum and Lithothamnion have been found in our seas, and it is probable that more would be found if sought for. They abound in the Adriatic and Mediterranean, and some species are known on the French coast.

M. Hauck seems to have bestowed much pains and care in the preparation of the work, and it will be seen that he has added very considerably to our knowledge of the fructification of numerous species. It may, however, be as well to remind him that the cystocarpic fruit of *Callithamnion Thuyoides*, *Call. polyspermum*, *Call. Borreri*, *Ceramium tenuissimum*, and *Grateloupia filicina*, which he does not mention, were described and figured in Harvey's *Phyc. Brit.* (Pls. 269, 281, 259, 90, 100). Also that the tetraspores of Nemaleon, which M. Hauck says (pp. 14, 59) are unknown, were described by Dr. Agardh, who had examined the living plant (see "Sp. Gen. et Ord. Algarum," vol. ii. p. 417 (1852).

It is to be hoped that we have found in this work the solution of a problem which for a long time has exercised the minds of algologists, namely, Does Porphyra belong to the Chlorosperms or to the Florideæ?

Although the colouring of Porphyra assimilates it to the Florideæ, yet the apparent agreement of its vegetative structure with that of the Ulvas, and especially of some of the species of Monostroma, had induced the elder algologists to place Porphyra among the Chlorophyllaceæ. The discovery of the fructification of the plants of both genera has however shown that they are widely separated. In Monostroma the only kind of fructification known consists of zoospores, which, when they first issue from the mother-cell, are endowed with active motion. In Porphyra the tetraspores were first discovered, then the antheridia; the antherozoïds are motionless. Algologists, however, still hesitated to admit Porphyra among the Florideæ, because no cystocarpic fruit had yet been found. M. Hauck now tells us that the cystocarps of some species are known (p. 21), and he describes those of *P. leucosticta*, as well as the tetraspores and antheridia of this plant (p. 25). There can, therefore, be no longer any hesitation as to including Porphyra among the Florideæ, of which it constitutes the lowest family.

On looking through the present instalment of this work, it will be seen that out of the 122 species, or thereabouts, which are described in it, about seventy are found on the British coasts—nineteen of the latter are common to the North Sea and Adriatic—twenty-seven of them inhabit the Adriatic, and twenty-four the North Sea. The work, when complete, cannot fail therefore to prove of great interest to algologists in this country.

The type is good, as well as the figures with which it is illustrated, and readers will no doubt be glad to know that in the printing German characters have not been used.

MARY P. MERRIFIELD

THE CHURCHMAN'S ALMANAC

The Churchman's Almanac for Eight Centuries (1201 *to* 2000), *giving the Name and Date of every Sunday.* By W. A. Whitworth. Pp. 23. (London: Wells Gardner, Darton, and Co., 1883.)

THERE never surely was such an age of almanacs. The social change whose effects meet us on every side has worked a revolution here. Some of us can call to mind the time when "Old Moore" ruled the reckoning in his peculiar, old-fashioned way, and Murphy blazed out like a meteor to expire like a farthing candle, and Zadkiel "Tao Sze" began to trade on human curiosity and credulity. But those days are past. Instead of being left, as of old, to make our own quiet, though limited, choice,